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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/744,877

01/29/2001

Aomar Halimaoui

5310-03000

8711

7590

02/27/2004

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EXAMINER

NOVACEK, CHRISTY L

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 02/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/744,877

Applicant(s)

HALIMA OUI ET AL.

Examiner

Christy L. Novacek

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1/26/04.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 2822

DETAILED ACTION

This Office Action is in response to the request for continued examination and amendment filed on January 26, 2004.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 26, 2004 has been entered.

Response to Amendment

The amendment of claim 28 is sufficient to overcome the rejection of claims 28-32 under 35 U.S.C. 112, first paragraph. Therefore, this rejection is withdrawn.

The limitations added to claim 28 are sufficient to overcome the rejection of claims 28-30 under 35 U.S.C. 103(a) as being unpatentable over Yamanishi (JP 07-094503) in view of Chittipeddi (US 5,918,116) and the rejection of claims 31-32 under 35 U.S.C. 103(a) as being unpatentable over Yamanishi in view of Chittipeddi and further in view of Tzeng (US 5,215,934). Therefore, these rejections have been withdrawn.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chittipeddi (US 5,918,116, previously cited) in view of Bergeron et al. (US 4,157,268, previously cited).

Regarding claim 28, Chittipeddi discloses implanting predetermined regions of a silicon substrate (10) with amorphizing ions (18), at an implantation energy of 5-500 keV (Fig. 5; col. 2, ln. 48-54; col. 3, ln. 19-37). The surface of the silicon substrate is oxidized to form a gate oxide layer (22) of non-uniform thickness and MOS transistors are formed at the predetermined regions of the substrate such that the oxidized layer at the predetermined regions forms the gate oxide layer of the MOS transistors (Fig. 7; col. 3, ln. 66-col. 4, ln. 26; col. 3, ln. 45-58). Chittipeddi states that the ions (18) are “selected for their ability to amorphize the epitaxial silicon layer 10 [substrate]” and, “[S]uch ions include silicon, fluorine, arsenic, and mixtures thereof” (col. 3, ln. 30-33). Chittipeddi does not disclose using ions of Ne or He. Like Chittipeddi, Bergeron discloses a method of implanting ions (18) into a silicon substrate (10) to damage the crystalline structure of the substrate and then subjecting the substrate to an oxidation process in order to oxidize the damaged substrate regions (col. 3, ln. 39-50). Bergeron discloses that the ions used to damage/amorphize the substrate may be silicon, helium, neon or argon (col. 3, ln. 42-43). At the time of the invention, it would have been obvious to one of ordinary skill in the art to substitute helium or neon ions for the silicon ions disclosed by Chittipeddi according to the equipment and materials on hand because Chittipeddi discloses that ions are chosen only for their ability to amorphize the silicon substrate and Bergeron teaches that any of these ions (He, Ne, Ar or Si) may be used for that purpose.

Regarding claim 29, as discussed above, Chittipeddi discloses that the implanting in predetermined regions is an ion implantation step (col. 3, ln. 19-25).

Regarding claim 30, Chittipeddi discloses the implanted dose is from 1×10^{12} to about 5×10^{16} ions/cm² (col. 3, ln. 34-37).

Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chittipeddi (US 5,918,116) in view of Bergeron et al. (US 4,157,268) as applied to claim 28 above, and further in view of Tzeng (US 5,215,934, previously cited).

Regarding claims 31 and 32, Chittipeddi discloses that the gate oxide layer can be grown by “any suitable technique”, which may include heating the substrate to a temperature of 600-1200°C and subjecting the substrate to a wet or dry O₂ atmosphere (col. 3, ln. 67-col. 4, ln. 6). Chittipeddi does not specifically disclose that this oxidation is done within a “furnace”. Like Chittipeddi, Tzeng discloses a method of thermally oxidizing a silicon substrate that has been implanted with oxidation-rate-enhancing ions (Abstract). Tzeng discloses that this oxidation step may be successfully accomplished by thermally oxidizing the substrate at a temperature of about 950°C for approximately 10 minutes in a dry oxygen atmosphere within a furnace (col. 6, ln. 9-15). At the time of the invention, it would have been obvious to one of ordinary skill in the art to conduct the oxidation process of Chittipeddi within a furnace as taught by Tzeng because both Chittipeddi and Tzeng are conducting the same type of oxidation process.

Response to Arguments

Applicant's arguments with respect to claims 28-32 have been considered but are moot in view of the new ground(s) of rejection.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN
February 20, 2004


AMIR ZARABIAN
SUPERVISOR/PATENT EXAMINER
TECHNOLOGY CENTER